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FINAL REPORT

To date roughly 70% of all raw data tapes received from Pioneers 8 and 9 have been translated into usable working formats and analyzed. During the late summer of 1970 Drs. K. G. McCracken and U. R. Rao visited Dallas from Australia and India, respectively, and greatly supplemented the efforts of the UTD Pioneer group.

Many of the recent Pioneer 8 and 9 results have been accepted for publication and have appeared or recently will appear in the scientific literature. A partial list of these results and studies currently being finalized would include:

(a.) Studies of the heliocentric longitude density gradient. It has been shown that performing simultaneous measurements of cosmic ray intensity at different heliolongitudes enables an estimate of the azimuthal gradient of the cosmic ray flux, which is essential for estimating the solar flare location as well as understanding the decay effects.

(b.) Studies of the decay phase of the solar flare effects. It has been shown that the decay of a flare enhancement is completely governed by the convection by the solar wind and the azimuthal gradient.

(c.) Studies of the anisotropic particle propagation of solar injected cosmic radiation. It has been shown that the anisotropy observed during solar flare effects undergoes a natural three phase evolution. These three phases may be taken as:

Phase 1: Field aligned anisotropies indicative of a high order of "guiding-center" motion. The anisotropies are generally aligned along the local Archimedes spiral configuration, and thus usually appear as arriving from the west. After ~1 day this high degree of particle collimation gradually becomes

Phase 2: Equilibrium anisotropies from the general Sun

direction. In this phase the cosmic ray evacuation is largely under the control of the convective properties of the solar wind. This phase gradually occurs between 1 - 4 days after the initial injection and rather quickly gives way to

Phase 3: Equilibrium anisotropies from directions close to 45° East of the satellite-sun line. During this phase in the flare event, the diffusive component of the cosmic ray population becomes significant enough to cause the bulk motion of the cosmic ray particles to move roughly perpendicular to the interplanetary magnetic field lines.

(d.) Studies of low energy particle propagation during specific solar flare effects. Of particular interest were the events of March 30- April 10, 1969 in which the occurrence of a series of complex flare events resulted in cosmic ray particle enhancements being apparent over almost 360° in solar longitude, and the event of March 12, 1969 which illustrated that the accessibility at 1 AU to cosmic ray particles is not a simple function of the relative solar longitude.

(e.) An intercomparison of the Pioneer 8 data with the UTD IMP-F data initiated a fruitful study of the co-rotating electron event of July 13, 1968.

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